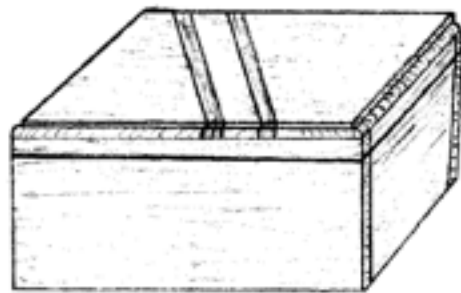
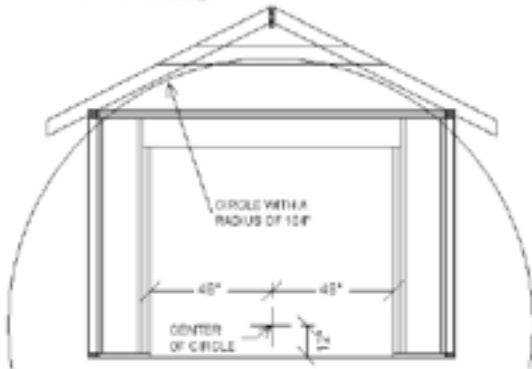
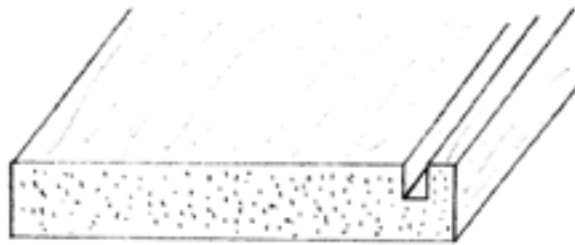


Exploring Woodworking



Name_____ Section_____

Individual Student Responsibilities

- Pencils: Students will be responsible for having a pencil to write with. You will be expected to keep a pencil on you at all times. No pencil will be loaned.
- You may NOT use ink pens! If you write on your wood with a pen, the ink will soak into the wood, and so it will not come off. Also, ink will bleed through any finish you put on your project.
- Know your limits: Please do not attempt to use any machine you are not familiar with. Also, please do not do anything you are not comfortable doing. Always be safe.

Wood Shop Safety Rules

1. Safety glasses are required to be worn at all times in the wood shop.
2. Long hair must be tied back. Hair, which is long enough to touch the shoulders, must be tied back before using any power equipment.
3. Loose clothing cannot be worn. Jewelry must be removed and long sleeves must be rolled up before operating machines. Open toed shoes/sandals are not safe in the wood shop!
4. Absolutely no running is allowed in the wood shop.
5. Never fight in the wood shop. Even if you believe you are only playing around, this will not be tolerated.
6. Never throw anything in the wood shop. If you are 2 feet away from a trash can, you may not toss something into it. NEVER THROW ANYTHING!!
7. No electronic devices such as cell phones, I-pods, mp3 players, etc. are allowed in the wood shop. Any such devices will be taken. They will not be returned until the end of the school day.
8. Never talk to or distract another student while they are using a power tool.
9. Never use any tool inappropriately. Do not crush pencils in the vises, do not drill holes in the tables, do not cut candy bars with the bandsaw, do not smash scraps with a hammer, do not use scraps of wood as weapons, etc...
10. Tools and materials can be dangerous. Do not handle either unless you have something specific in mind.
11. Do not destroy school property.
12. All safety guards on all tools must be in place and used at all times.
13. Disconnect power before changing blades or belts or making adjustments.
14. Do not leave a machine until all motion has stopped.
15. Clean your area when through.
16. Devote all your attention to the machine or tool you are using.
17. When help is needed on an operation, ask for only enough help to do the job.
18. Do not enter the shop unless a teacher is present.

Wood shop Safety Rules Continued

19. Ask teacher before using any power tools (each time). You must have your glasses on, with your project in hand. You must know what tool you need to use, and you must explain what you need to do.
20. Never ask to use a tool for which you have not passed the safety test.
21. Never steal anything. If there is a scrap you believe to be trash, do not take it without asking.
22. Never touch another students project. If you do, the teacher will assume you have stolen it, and will act accordingly.
23. Make sure your name and company are written on your project. If your project is in multiple pieces, your name and company must be written on every piece. Any project found with no name on it will not be returned. This is to protect you, as projects without names on them get stolen by other students who will claim the project as theirs. If you don't write your name on it, I won't know who's project it is.

I have read and understand these safety rules.

I agree to obey these rules at all times.

I agree to accept the consequences should I not obey these rules.

Student Signature

Wood Shop Clean-up Procedure

1. As soon as teacher announces that it is clean-up time, put away all tools that you are using, or have used this period.
2. Place all tools where they belong.
3. Brush off table and tools.
4. Everyone in your company must work together as a team, and every person in your company will be held accountable if the clean up is not completed.
5. Place all trash, scrapped wood, empty cans and such in the trash can.

Measurement

History:

When woodworking, we do not use the Metric system, but instead use the Standard, or English system of measurement, meaning we measure in feet and inches, not in centimeters.

In the Standard system of measurement, inches are broken down in to fractions. We will use rulers which have each inch broken into 16 sections. Each of these sections is $\frac{1}{16}$ of an inch. Sometimes we may use rulers which have each inch broken into 8 sections, which will make each section $\frac{1}{8}$ of an inch.



On this ruler, notice that each inch is broken into 16 parts. Also notice that only the inches are numbered. The lines that divide each inch are different lengths, but they are not numbered. If every line were numbered, the ruler would have way too many numbers on it, and would just get confusing.

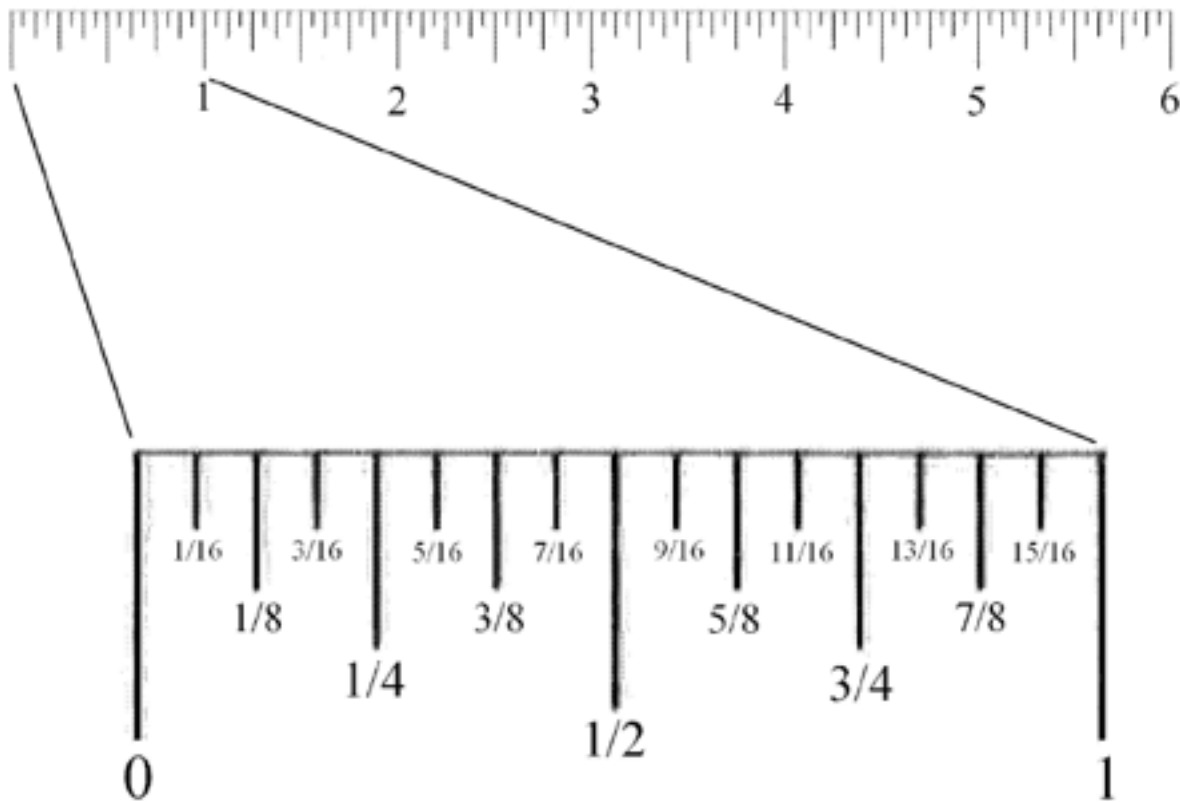
Sometimes people wonder why inches are broken into 16 sections, and not 10 or 14 or some other number. An inch is broken into 16 section because that is what we end up with if we keep taking half of something. Before accurate ways to measure and weigh things existed, this was a simple way to divide things into equal portions.

Have you ever noticed that a large pizza is most often cut into 8 or 16 pieces. This is because the person cutting the pizza first cuts it in half. He then cuts each half in half, ending up with quarters. He then cuts each quarter in half ending up with eighths, and then if the pizza is big enough, cuts each eighth in half, ending up with 16 pieces.

How we measure, and how we write measurements:

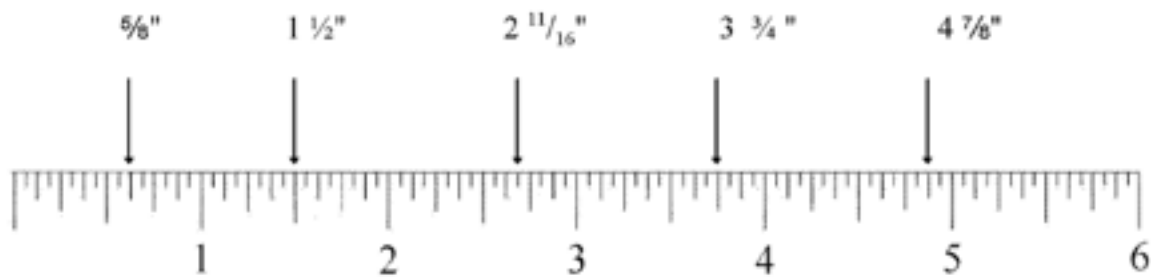
Here is a ruler which is 6" long. Each inch is divided into 16 parts.

Here is an enlarged picture of the first inch on a ruler.



- Each $\frac{1}{16}$ " mark is labeled.
- All fractions are reduced.

If you count over from the beginning of the ruler 5 spaces, you will see that mark labeled as $\frac{5}{16}$ ". The next mark is not labeled as $\frac{6}{16}$ ", but is instead reduced down to $\frac{3}{8}$ ".



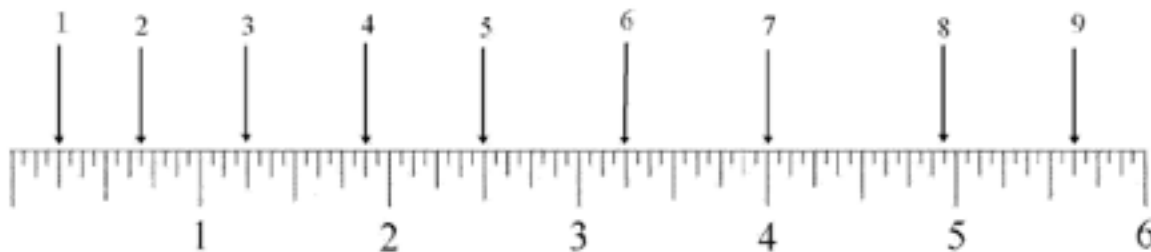
Notice how the 5 different measurements shown on this ruler are written:

The first one, $\frac{5}{8}$ ", is 10 spaces over from the beginning of the ruler. It could be written as $\frac{10}{16}$ ", but we reduce that fraction to $\frac{5}{8}$ ".

The next one, $1 \frac{1}{2}$ ", is 8 spaces past the 1" mark. It could be written as $1 \frac{8}{16}$ ", but we reduce it to $1 \frac{1}{2}$ ".

All of these measurements are written in the correct way.

Practice: Correctly write the measurements for the following 9 locations on the ruler.



1. _____ 2. _____ 3. _____ 4. _____ 5. _____

6. _____ 7. _____ 8. _____ 9. _____

The Importance of Sequencing

Almost everything that you will do in this shop will need to be done in a specific sequence. As such, the instructions for each of the projects list each step that you must accomplish in the order that you must do them.

There are 4 primary reasons why you must build your projects in a specific order:

1. You need to do things which are actually possible! Some things simply can not be done until you have done something else first.
2. Safety. Certain cuts are safer to do before other cuts are made. Even though you may be able to reverse two steps, the steps are in a specific order so that the cuts would be made in the safest possible manner.
3. To produce the highest quality work, you can often get far better results by making cuts in a specific sequence. If you don't follow the steps given to you in their exact order, you may find that your piece of wood will break, or end up being the incorrect shape.
4. It is often much more efficient to do things in a certain order. Although you may be able to accomplish something by doing it a certain way, you may be able to accomplish the same thing more quickly by doing it in a different order.

So remember: Always follow every step in your project instructions in exactly the order they are written.

Hand Tool Safety Instructions

There are several general rules which should be considered when using hand tools.

1. Never have any part of your body in a position where a hand tool could cut it.

Here are some examples:

- Never point a chisel toward yourself. If you slip, it could severely wound you.
 - Never have your fingers or thumb in line with a cut you are making with a handsaw. A sharp handsaw could easily cut a finger off in a single stroke!
2. Always have the wood you are cutting securely clamped to a work table, or have it clamped in a vise. If it isn't, you are far more likely to slip with your tool and injure yourself.

3. Always hand a tool to someone else **handle** first. This is the safest way to pass a tool. Do not let go of the tool until you are certain that the other person has the tool securely. **Never throw any tool ever!**

4. Watch your fingers when using a hammer! You may think you won't miss that nail, but often times when the head of the hammer hits the nail, the hammer deflects off of the nail, and whacks any nearby vulnerable fingers.

5. As when doing anything else in this shop, you must wear safety glasses when using tools. People frequently sustain eye injuries when using a simple hammer to drive in a nail.

6. Hand tools can be used as weapons! If you choose to threaten someone with a hand tool, even if you are joking around, it will be assumed you were threatening them with a weapon with intent to cause severe bodily harm.

7. Always put hand tools back exactly where you got them from.

8. Let the teacher know if any tool is broken, or if you suspect it might be. It is unsafe to let someone else use a tool which is defective.

9. Never use any tool for any use other than its intended purpose. Doing so will likely ruin the tool, and is likely to be unsafe.

Power Tool Safety Instructions

In this section of this manual, there are instructions for the safe use of the machines in this shop. Each tool section includes several things:

1. A description of what the tool is used for.
2. A list of safety concerns specific to the use of this tool.
3. A picture of the tool with the most important parts labeled.

Any of these tools has the capability to remove your fingers, your eyes, and in some cases, they could kill you. Take them seriously.

You will not be allowed to use any tool if I am not extremely confident that you will use it safely!

Drill Press

Function: To drill holes in wood.

Why we use it: The Drill Press is able to drill holes in wood far more accurately than a hand held drill. Because we clamp the wood to the table of the drill press, we are able to accurately control:

- The precise location of the hole.
- The exact depth of the hole.
- The exact angle at which we will drill the hole.

Safety Concerns: Because the Drill Press produces a great deal of torque, or rotational energy, we must securely clamp the piece of wood to the drill press table. If we don't, the wood will likely spin out of control, damaging the wood, the drill bit, and potentially the operator.

It is extremely important to tie back long hair. If long hair is not tied back, it could catch on the drill press as the shaft is rotating. This could pull in the operator causing a severe injury. All loose clothing must be removed before using the drill press. Failure to do so could result in the clothing getting caught in the drill press, which could pull the operator in and cause a severe injury.

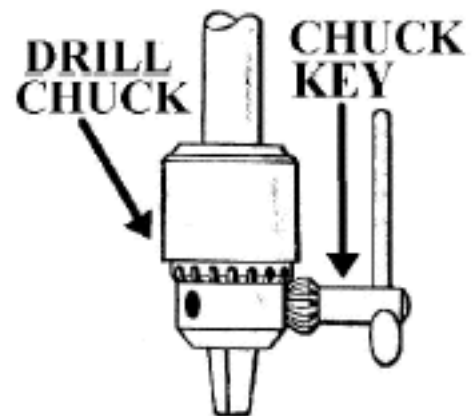
The drill bit must be securely mounted in the drill chuck. The drill chuck is tightened using the chuck key. This must be done before operating the drill press. If the drill bit is not secure, it could come loose and damage the wood, the bit, and potentially the operator.

After tightening the drill bit, it is extremely important that you remove the chuck key. Failure to do so could be very dangerous, as the chuck key could fly out and injure someone.

If the piece of wood clamped to the table comes loose, you must immediately turn off the drill press and take a step back. Once the wood comes loose, it could fly off the table, causing an injury to the operator.

You should never wear gloves when using the Drill Press, or any other machine in the shop. A loose glove could get caught in a tool and drag your hand in, causing a severe injury.

Small drill bits will generally require the Drill Press to be set at a faster speed, whereas larger drill bits will require the machine to be set at a slower speed. However, in this class only the teacher will change the speed of the Drill Press.



Types of Drill Bits and their Uses

Twist Bit

The Twist Bit is most often used for drilling small holes in wood or metal. It produces a decent hole, but not an extremely clean hole.



Spade Bit

The Spade Bit is an inexpensive bit used for drilling larger holes in wood. It drills quickly, but won't produce a very clean hole.



Forstner Bit

The Forstner bit is used for drilling larger holes in wood. It will produce the cleanest hole of any drill bit. These bits are quite expensive.



Multi-spur Bit

The Multi-spur bit is a type of Forstner bit, but has teeth to help it cut more quickly. It produces a clean cut.

Hole Saw

Hole Saw bits are used for cutting holes in wood. They produce a decent cut, and they cut quickly, as they only cut at the perimeter of the circle, so very little wood is actually turned into sawdust.



Countersink Bit

The Countersink bit creates a pocket into which the head of a screw will sit. It is by using a bit such as this that a screw head can be set below the surface of the wood.

Additional Information:

When drilling a hole using the Drill Press, the hole will turn out best if a scrap piece of wood is clamped underneath the piece of wood you are drilling a hole in. Doing this will prevent the wood you are drilling into from splintering as the drill bit exits the bottom side. If you are unsure about the speed of the Drill Press, ask the instructor to check it and adjust as needed.



Band Saw

Function: To make curved and irregular cuts in wood.

Why we use it: The band saw is an excellent tool for making curved cuts in wood. Because the blade travels only in one direction, the wood you are cutting is not likely to jump around as you cut it, as it sometimes does when using a jig saw or a scroll saw. Also, because the blade is one long continuous loop, we can cut wood up to 10" thick with this tool.

Safety Concerns: When using the band saw, it is important that you lock the blade guard in place so that it is no more than 1/4 inch above the wood you are cutting. The guard should not be higher than this for a few reasons:

Having it too high exposes more of the blade, which is dangerous. The guard also holds the blade in place. If it is too high, the blade will be much less stable, which will result in an inferior cut. The blade is more likely to be twisted and break if the guard is too high.

When you are done with the band saw, you should do these 2 things before leaving the machine:

- Wait for the blade to come to a complete stop.
- Lower the blade guard down to the surface of the table.

You should always keep your fingers at least 2 inches away from the moving blade. If they are closer than this, they could get thrown into the moving blade if the wood catches or if you slip while making your cut.

Never stand to the right of the band saw table. Also, never allow anyone else to stand to the right of the table. If the blade should break, it is likely to shoot off of the table in that direction. If someone is standing there, they could be severely wounded, perhaps even eviscerated.

You should never back out of a cut you are making while the blade is moving. Doing so could cause these problems:

- It could burn or splinter your wood.
- It could pull the blade off the wheels.
- It could bend or break the blade.

If the blade starts to bind, do not force the wood to complete the cut. Instead, turn off the machine and figure out why the blade is binding. If the blade starts to make a clicking sound it is likely because the blade has a crack in it.

If this happens, you should immediately do these 2 things:

- Turn off the machine.
- Tell the instructor.

When cutting a sharp turn on the band saw, the blade can bind, bend, or even break. To help prevent these things from happening, it is necessary to make relief cuts in the wood. By

making these cuts first, small pieces of wood are cut loose from the wood as it is being cut. This is an example of relief cuts:

- Never touch the two adjustment knobs which adjust the blade tension and the angle of the top wheel. If you move these knobs, the blade could come off the wheels.
- Never open the doors which cover the drive wheels.

Additional Information:

When making a cut on the band saw, cut to the outside of your line, leaving a small amount of material which you will be able to sand away. This will allow you to more precisely create your piece of wood.

If you are making a cut in a board, and you want to save both pieces of wood, cut exactly on your line, and do not back up if you stray from your line.



Radial Arm Saw

Function: To make 90° crosscuts in wood.

Why we use it: Using the radial arm saw is a quick way to cut a longer board into shorter pieces. It has a very long table, so we can easily support a long board. With this tool, the saw actually moves, while your board remains stationary. The radial arm saw slides forward on a track arm, while the board remains in place, firmly against the fence. If you are crosscutting a rough board which may be warped, you will use the radial arm saw. Cutting a warped board with the miter saw would be unsafe.

Safety Concerns: Do not cut a board less than 2 feet long on the radial arm saw. If you have a shorter board to cut, you will use the band saw or the miter saw. The board you are cutting must be placed firmly against the fence when making a cut with the radial arm saw. If you try to cut a board without it being against the fence, as soon as the blade makes contact with the board, the board will jerk back, and the saw will jerk forward. This could damage the board, damage the saw, and potentially cause an injury.

Make sure there are no scraps of wood or piles of sawdust against the fence before you place your board on the table. If there are, they will prevent your board from being firmly against the fence where it needs to be. If the board you are cutting is warped, you must make sure that it contacts the fence where the blade will contact the board. If you place the board so that it contacts the fence at the ends of the board, but not in the middle where the blade will contact the board, when the cut is almost complete, the board will jerk back, and the blade will bind in the board. This could damage the board, damage the saw, and potentially cause an injury.

You must firmly hold the board with your left hand while you make your cut. Apply gentle pressure on your board, pushing it back towards the fence. You must firmly hold onto the saw itself with your right hand as you make your cut. When the saw contacts the wood, it will want to forcefully move towards you. You must be ready for this, and control the saw so that it makes a slow, controlled cut.

Keep your hands, including your thumb, at least 6" from the path of the cut. If your hand is closer than this and the blade catches on the board, your hand could get thrown into the blade, potentially resulting in a severe injury.

Make sure the saw is pushed all the way to the back of the track arm before turning it on. If you turn on the saw and the blade is in contact with your board, the board will jerk back, and the saw will jerk forward. This could damage the board, damage the saw, and potentially cause an injury. If the saw does jerk forward and bind in the wood, immediately TURN IT OFF. Do not attempt to push the saw back before turning it off.

After you complete your cut, make sure to push the saw all the way to the back of the track arm. You do this to make sure the saw is in place for the next cut.

Do not attempt to remove scraps from the saw table, or leave the saw, until it has come to a complete stop. This saw takes a few seconds for the blade to stop spinning after you turn it off. Please be patient, and avoid an injury.

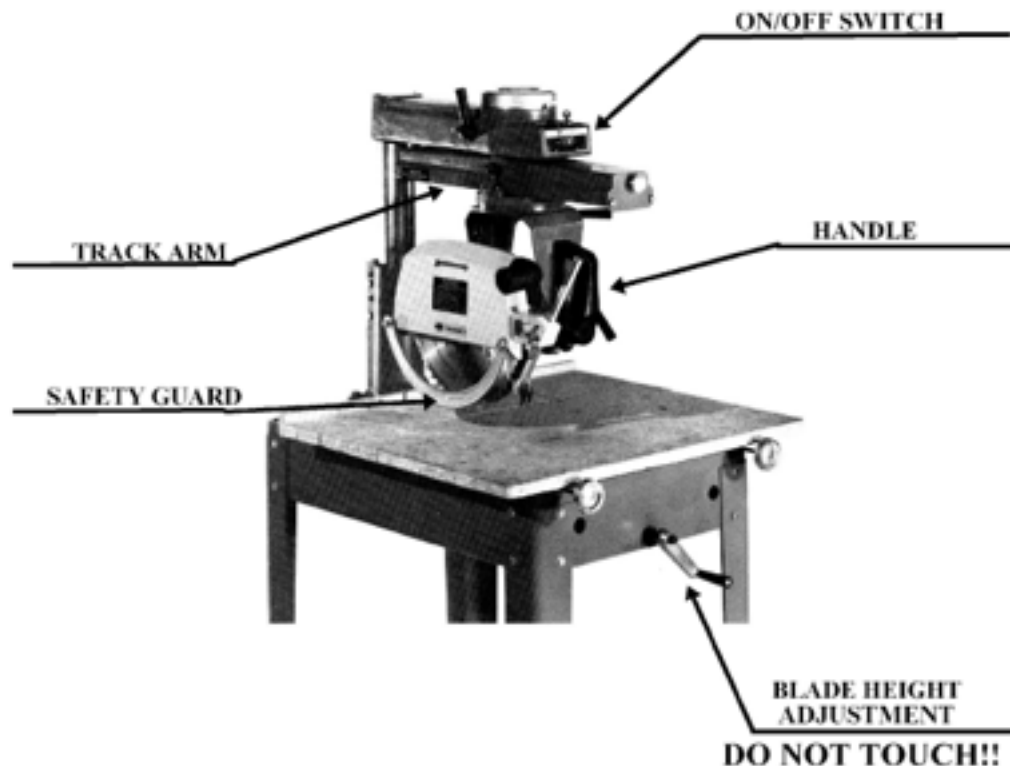
Do not touch the adjustment knobs on the front of the table. The instructor will make sure the saw is adjusted properly. If you believe it is not adjusted properly, notify the instructor.

Additional Information:

The radial arm saw is not the most accurate tool. Because of this we generally use it only to make rough crosscuts in longer boards. It is important to cut your board a little longer, usually about 1", than your final board needs to be.

When you need to make a precise crosscut, you must first make sure your board is perfectly straight and flat, and then cut it with the miter saw.

Most students are quite surprised when they first use the radial arm saw at how forcefully the saw seems to want to lurch forward. It is very important to brace your right arm and carefully control the speed of the cut.



Miter Saw

Function: To accurately make crosscuts in wood.

Why we use it: The miter saw is the best tool to use to make virtually any crosscut in wood. It is far more accurate than the radial arm saw. The miter saw also has the ability to crosscut a board at an angle. The blade can also tilt, allowing you to crosscut a piece of wood with a bevel cut.

Any time you need to accurately cut across the grain of a straight piece of wood, the miter saw is probably the tool you will want to use. The miter saw is also commonly referred to as the chop saw.

Safety Concerns: The board you are cutting on the miter saw needs to be flat and straight. Your board must be held firmly against the fence when making a cut with this tool. If it is not, it will jerk back towards the fence, and the saw will be forced toward you.

Like the radial arm saw, this saw also moves along a track arm. You must make sure the saw is all the way at the back of the track arm before turning on the saw. If it isn't, it could be touching your board when you turn it on. This could result in the saw jerking forward, the board jerking backwards, and an injury occurring.

You must keep your hands and fingers, including your thumb, at least 6" away from the path of the cut. If they are closer, they could easily get thrown towards the blade, resulting in an injury.

Your board needs to be long enough so that you are able to securely hold it against the fence while cutting it. For this to occur, and in order to keep your hands a full 6" from the path of the cut, your board should be at least 8" long.

This saw will force its way toward you as you cut, so you must hold the saw securely and control it in order to make a slow, controlled cut.

Make sure there are no scraps of wood or piles of sawdust against the fence before you place your board on the table. If there are, they will prevent your board from being firmly against the fence where it needs to be.

Do not try to rip (cut with the grain) a board on this saw. It is dangerous, and will do a lousy job. The table saw is a much better tool to use to rip a board.

This saw moves not only back and forth along the track arm, but also moves up and down.

In order to safely make cuts with this saw, you should follow the following sequence of moves for each cut you make:

While putting pressure back on the saw to prevent it from moving toward you, lower the saw down in to your board. Make sure it is all the way down before proceeding to the next step.

While firmly holding the saw down, slowly pull the saw toward you as far as it needs to go to complete the cut.

- Release your finger from the power switch.
- Wait for the saw blade to stop, then push the saw to the back of the track arm.

Additional Information:

When using this saw, you must apply pressure toward the back of the saw when you push the blade into the wood. If you don't you will find that the saw will want to move toward you before it moves down.

When students first use this saw, they will often cut only half way through the board, as they do not push down hard enough before pulling the saw toward them.

Do not try to cut a board that is too short, especially when cutting at an angle, as the saw will easily grab the board and throw it, sometimes at somebody else, and sometimes at you!

Remember that your thumb sticks sideways out from your hand. Make sure it is at least 6" from the path of the blade. Having a thumb cut off is one the most common injuries from this saw.

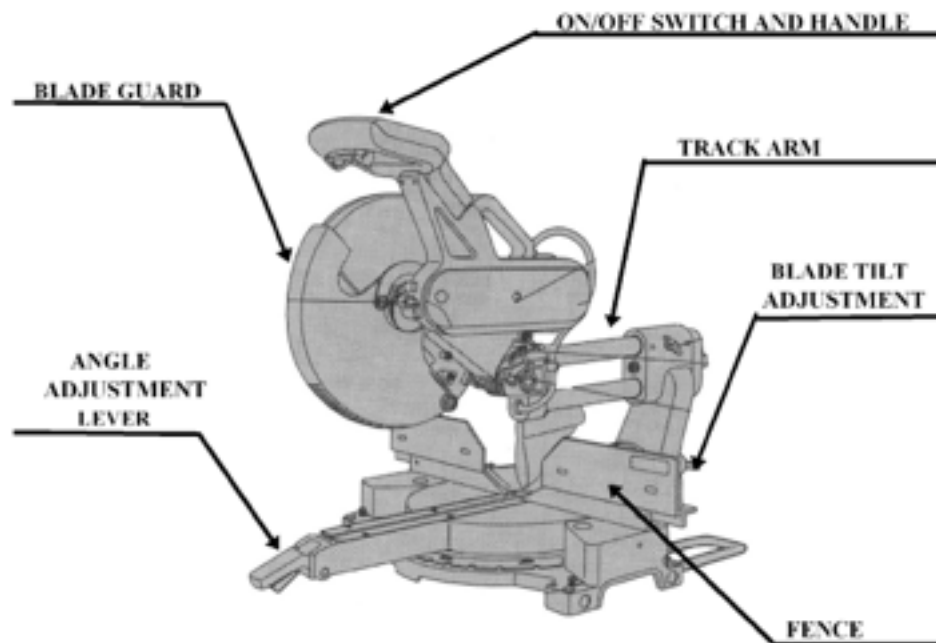


Table Saw

Function: To accurately cut wood in several different ways.

Why we use it: The table saw is the most important tool in any woodworking shop. It can be used for many different types of cuts, and it is extremely accurate.

In this class, we will use the table saw primarily for two different purposes:

- To accurately cut a board parallel with the grain. This is called a rip cut.
- To make wide grooves in wood. These grooves are called either rabbets or dados, depending on how they are located on the board.

We will rarely use the table saw to make crosscuts in this class. To make crosscuts, we will be using the miter saw. The miter saw is almost always a better tool for making crosscuts.

Without question, the table saw is the most dangerous tool in this shop. Most severe amputations, primarily lost fingers, happen on the table saw. Because of this, it is incredibly important to fully understand how this tool works, and how to use it safely. There is also a serious risk for wood to kick back on the table saw. If wood kicks back, it can come towards you at speeds of over 100 miles per hour, which can injure, or kill you. Because of this it is very important to understand why kick back occurs, and how to avoid it.

Safety Concerns: When using the table saw, the blade guard must always be in place whenever it is possible to do so. Some cuts, such as dado cuts, require that the guard be removed, but those cuts must be done exactly as the instructor tells you, and the riving knife must be installed.

You must keep your fingers at least 4" from the blade at all times. If you can't make a cut without keeping your fingers at least 4" away from the blade, you must use a push stick. If you can't keep your fingers at least 4" from the blade even with a push stick, you may not use the table saw for that cut.

The table saw blade should be adjusted so that it is 1/4" above the piece of wood you are cutting. If it is higher than this, it creates a greater risk. Make sure the saw has come to a complete stop before moving the blade guard, making an adjustment, or removing any scraps of wood from around the blade.

Your piece of wood should be at least 6" long to safely cut on the table saw. If it is shorter than this, you may not use the table saw to make that cut. You may not cut a warped or twisted board on the table saw. Before cutting a board on the table saw you must make sure it is straight and flat.

You must never stand directly behind the blade or piece of wood you are cutting. Instead stand slightly to one side so that if a kickback should occur, the wood will be less likely to hit you. You must hold your material very firmly when using the table saw. If you don't it will be more likely to catch on the blade and kick back.

Make sure the rip fence is securely locked before making a cut. If the rip fence moves as you are making your cut, many very bad things will occur!

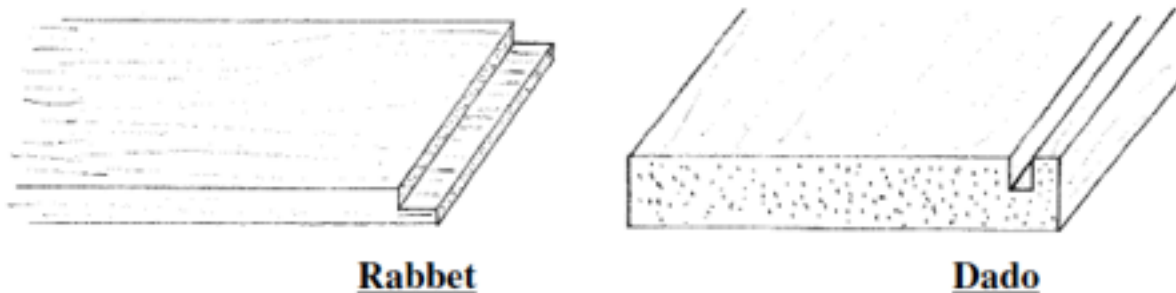
Safety Concerns Specific to Rip Cuts:

When ripping a board, the rip fence must be perfectly parallel to the blade. If it is not, the wood will bind between the rip fence and the blade and kick back will likely occur.

Push your piece of wood all the way past the blade, letting it fall onto the floor. DO NOT leave a piece of wood on the table near the blade while the saw is still running.

Do not reach over the blade to lift your board off of the table after making your cut. Instead, let the board fall off of the table onto the floor. The edge of your board which is in contact with the rip fence must be perfectly straight.

Safety Concerns Specific to Cutting Rabbits & Dados:



Rabbit

Rabbets are cuts which are basically notches at the end of a board. We make this cut using a table saw set up with a special blade which cuts a very wide path through the wood. Because the cut does not go all the way through the board, we can't use a typical safety guard when making these cuts. Instead, we use a block of wood mounted to the fence over the blade. This block, which we call the safety block, does two things:

- It helps to hold your board down on the table as you make your cut.
- It covers the blade so that if you slip, you are less likely to make contact with the spinning blade.

Dado

Dados are grooves cut in a piece of wood. We will usually make these cuts using the table saw with a regular blade, with the blade raised only slightly above the surface of the table. Once again, because the blade does not cut all the way through the board, a typical safety guard can not be used. When making a dado, you must use the saw set up exactly as the instructor shows you. The blade will be exposed, but it will be very close to the rip fence. You will use a push stick as needed to keep your fingers at least 4" from the moving blade.

Some specific rules to remember when cutting a rabbet:

- The safety block must be in place when making a rabbet.
- When cutting a rabbet, you must use the miter gauge to hold your board. Never try to make a rabbet using only the rip fence as your guide.
- After pushing your board across the blade, do not pull it back over the blade while the saw is still running.

Some specific rules to remember when cutting a dado:

- Even though the blade does not go all the way through the wood, never place your hand or your push stick directly over the blade.
- Make sure your pieces are firmly against the rip fence. If they are not, kickback can occur.

Understanding Kick Back:

Kick back on the table saw usually occurs for one of two reasons:

- If the blade and the rip fence are not parallel, the piece of wood will get pinched between them, and the pressure of the blade will force the wood back. This is why it is so important to be certain that the rip fence is adjusted correctly.
- If you leave a piece of wood on the table after you make a cut, it can catch on the back of the spinning saw blade. The wood will be lifted up by the blade, and then it will fall on top of the spinning blade. The teeth on the top of the spinning blade catch the wood and throw it, at a speed of approximately 110 miles per hour. This is obviously very dangerous, which is why you must push your board all the way off of the table.

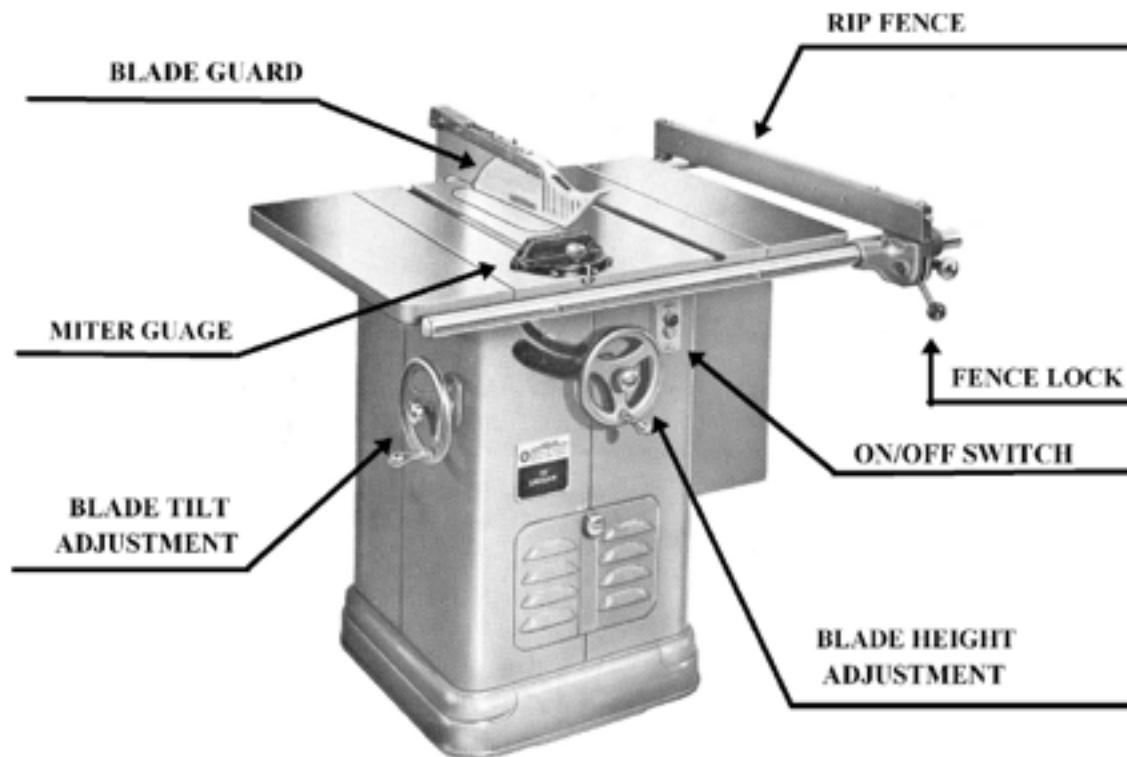
Both types of kickback occur more easily with a lighter weight piece of wood, such as 1/4" plywood. Because it is so light, the wind from the blade will cause the wood to float up, after which it will move into the blade, and be thrown. Once air born, it flies very fast, and very far, slicing through whatever, or whoever, is in its way.

The main rules to remember to avoid kick back are:

- Hold the wood firmly.
- Make sure it stays in complete contact with both the table and rip fence at all times, especially after it passes the blade.
- Push your board all the way off the table.
- Make sure the rip fence is adjusted correctly.
- Don't stand directly behind the blade or wood.

Additional Information:

Once you learn to use the table saw correctly and safely, you will be able to build far better projects. It is truly an invaluable tool to have. Just be certain to take it seriously, and if you have any questions about its safe use, never hesitate to ask these questions. The table saw can be used for many other types of cuts that we will probably not make in this class. We will use it only for rip cuts, rabbets, and dados. Crosscuts will be made on the miter saw. Small pieces of wood which may chip off of your board as you are cutting it will fly from the table saw at tremendous speed. Small scraps will very likely hit your safety glasses on a regular basis.



Circular Saw

Function: To accurately make crosscuts in wood.

Why we use it: The circular saw is the best tool to use to make virtually any cut in wood. It is similar to the Mitre saw, but used freely without the stand. The circular saw also has the ability to cut a board at an angle. The blade can also tilt, allowing you to crosscut a piece of wood with a bevel cut.

The circular saw is not an accurate tool for cutting, as it relies on your ability to cut a straight line. It can be used with a guide tool to help you cut straight lines, but it will still need some practice.

Types of Circular Saws:

There are different types of circular saws:

- 5 inch (12.7 cm) trim saws, usually with a fine-toothed blade and often with the blade located on the left side of the motor, for easy viewing of the blade path. These are available in 120V, AC models, and rechargeable battery models in various DC voltages.
- 6 1/2 inch (16.5 cm) saws, as shown in the illustration above, used for cutting to length nominal lumber for construction, as well as ripping lumber, and cutting plywood or composite material.
- 7 1/4 inch (18.4 cm) saws, often call skilsaws, from the name of a major circular saw manufacturer, Skil. These are the backbone of the construction industry, used for cutting lumber up to 2 1/4 inch (5.7 cm) thick. They are used for cutting framing lumber to length, and ripping lumber. They also have a number of optional blades which can be used for cutting composite materials, concrete, ferrous and nonferrous metal sheeting, pipe, tubing, and even cold-rolled steel bar stock.
8 and 10 inch saws, used for cutting to length larger lumber or timbers, up to 4 inches (10.2 cm) thick. These are heavier, more cumbersome tools used mostly in industrial work.
- Worm-drive saws have a gearbox with a worm-gear drive, and are found in 7 1/4 inch (18.4 cm) models which are most commonly used for ripping lumber or cutting plywood decking or sheathing. They typically have the blade on the left side of the machine, to make watching the blade path easier when cutting parallel to the edge of a wide sheet of plywood.

Basic Functions:

The following are basic functions of some of these features:

- The base plate can be tilted to make angled cuts. Most saws adjust from 90 degrees to slightly less than 45 degrees, making it possible to cut bevelled ends on boards for corning attachments, hip-roof rafter cuts, and even miters. Most saws are equipped with a thumbscrew or lever to loosen the bolt which keeps the saw blade on the correct angle for the cut you are making, located on the front of the saw. Some are also equipped with a scale which indicates the blade angle, from '0' (90 degrees, or square to the board surface) to 45 degrees.

- The blade can be set to the depth required for individual cuts, from less than 1/8 inch (0.3 cm) to the full depth the blade is capable of penetrating. The lever or thumbscrew which locks the base plate at the desired height is usually located at the rear of the motor on the left side.
- Many circular saws are equipped with a ripping fence, to guide the blade as you make a rip cut along the edge of a board, giving you a straighter, parallel cut.
- Dust ejector. A few newer saws are equipped with a dust ejector to blow the sawdust away from the operator's face and from the mark where the cut is being made.
- Laser tracking light. Some newer saws are equipped with a laser that projects a bright, red line down the path of the blade travel. These can also be purchased to retrofit on older units that are not factory equipped with them.
- Blade guard. This should be considered an essential safety feature on any saw, and has two parts, the fixed guard over the top of the blade, and the floating guard, which rolls out of the way as the saw is pushed into the work piece. Some have a handle so the blade guard can manually be lifted for plunge cutting or easier viewing of the cutting mark.

Blades:

The blades range in blade composition, number of teeth (cutting bits or surfaces), the amount of set (the width of the kerf removed by the blade), and the blade quality.

- One of these circular saws will probably have a plain HSS (high speed steel) saw blade in it when it is bought new.
- TCT (tungsten carbide tipped) blades are much more durable, especially in tough hardwoods. Also plywood and composite boards are hard on blades so TCT blades are needed on them.
- Blades with fewer teeth (say 28) and with less rake to the face of the teeth, are designed for ripping along the length of timber, with the grain. They typically give a quick rough cut. They are cheap to buy and cheap to sharpen, since they have fewer teeth.
- Blades with more teeth (say 40) are designed for crosscut type work. They give a lot neater cut in most circumstances.
- Abrasive blades are made from carborundum or other abrasive materials bonded together in a resin or other synthetic binding material, and are used for cutting concrete or metal. They tend to wear away rather quickly, but for small projects, they are inexpensive and make fast cuts.
- Diamond rim blades. These blades are made of special alloy metals with industrial diamonds embedded in the rim (around the outside diameter of the blade), and are for cutting hard concrete, cement composite materials, and masonry products like block or brick.
- Special tempered alloy blades. These blades have tempered carbon steel teeth, which are very fine (small, and closely spaced) for cutting sheet metal like galvanized roofing metal, or aluminum, copper, or brass tubing.
- Dado blades. These are blades which can actually be adjusted to cut different width kerfs (the width of the material removed in the blade path). These blades make it much faster and easier for cutting dados and rabbets, used for joining lumber.

- Trim and panelling blades. These blades have fine teeth for making smooth, accurate cuts on finished materials like mouldings and panelling.

Safety Concerns:

Support the material you are going to cut so that the blade will not react with anything underneath the cut as it is made. For example, do not lay a board on a floor or concrete slab for cutting. Sawhorses or a saw table are normally used for this purpose.

Mark the lumber you are going to cut to length, using a measuring tape, scaled rule, or stick rule, then use a square (either a steel square, tri-square, or angle square) to mark the path of the blade travel for the length of your cut.

Set the saw for the proper depth of cut. Don't have much more of the blade showing than you really need for the job you are doing. So to cut 40mm thick timber, set your blade to about 45mm or 50mm. This helps to minimize kickback.

Keep your saw guard in smooth running condition. It should spring back in place as soon as you lift the saw off the work. It should slide up smoothly as you push onto the work. Make sure it's in the DOWN position before you put the saw down on the bench.

Look down the face of the right hand side of the blade and line it up to the pencil mark when beginning your cut. Look at the front of the saw to the two guide notches. The right hand one is a guide for cutting with the blade set in the normal position, and the other one is for when the base angled at 45 deg. Line the notch up to the pencil line.

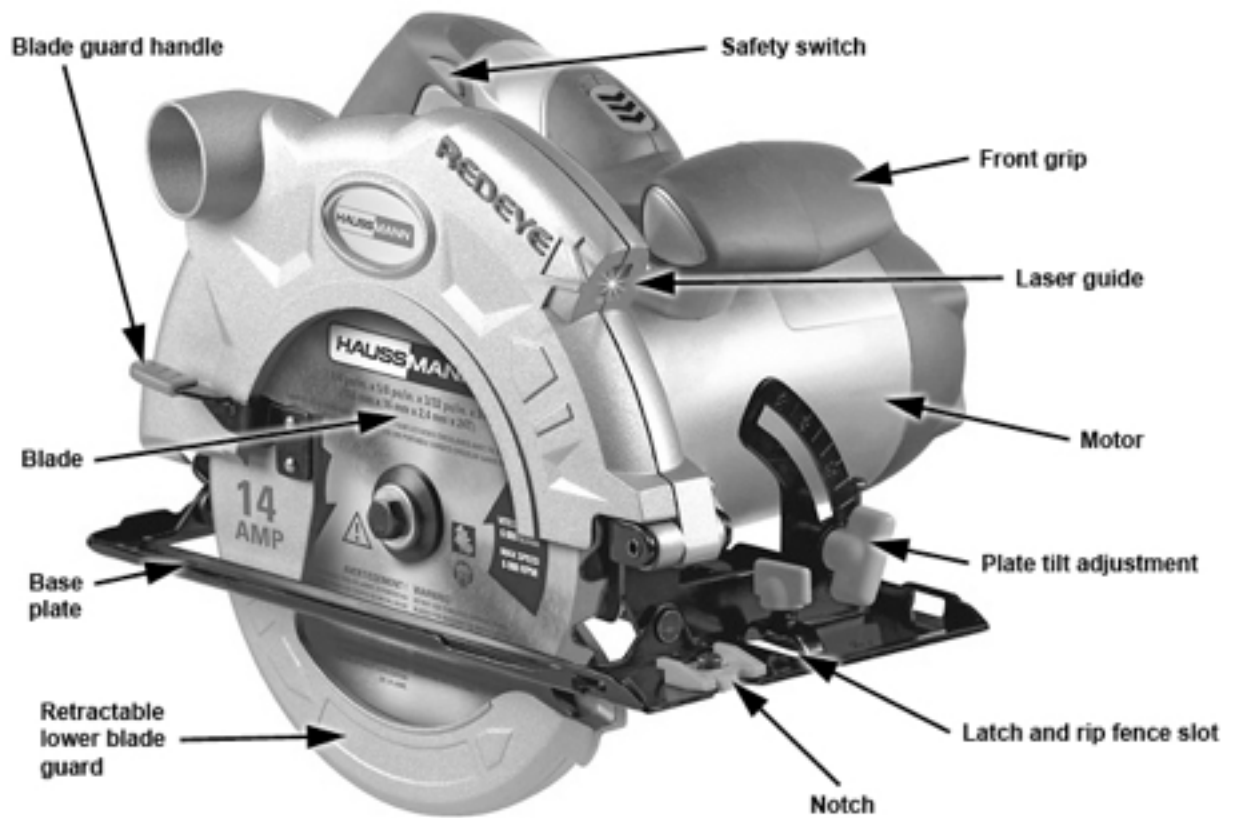
Start cutting, after a quick check to the front of the blade. (photo 1) Keep your eye on the guide (photo 2) all the time. This puts you in a natural position looking forward along the pencil line, and out of the way of any sawdust. Keep an eye on the saw base as you are into the cut. Make sure that you are keeping the base of the circular saw flat on the timber being cut.

Push the saw into the material with enough force to keep the blade cutting, but avoid pushing so hard the motor speed seems to decrease, or binding occurs on the blade. A sharp blade should pass through any but the hardest materials with minimal effort.

Be sure the lower blade guard returns to its position when you exit the cut. Even a blade guard in good condition will occasionally bind if a piece of debris from the cut becomes lodged in its mechanism.

Additional Information:

When using this saw, you must apply pressure evenly down on the wood that you are cutting. Don't allow the front or the back to lift up, this can cause the wood to splinter. Remember to stop the blade completely before you lift the saw out of the wood as to avoid splintering as well.



Staining and Painting

There is a yellow cart for painting and staining in the wood shop room. There is also a blue bin with newspaper. On the top shelf of the cart, you will find any paint cans, stain cans, and brushes needed for painting and staining. On the bottom shelf, you will find the newspaper bin, as well as a box with gloves just for painting and staining. **These gloves do not get mixed with the wood gloves!**

All painting and staining will be done outside. Paint and Stain produce dangerous fumes that need a well ventilated area. Choose a wise location outside that is not near any sand or dirt that can blow on to the product. Stay away from classroom windows as well.

Staining/Painting Procedure:

Place plenty of newspaper on the surface you wish to paint/stain on. There should be at least a foot of newspaper around the wood product.

Mix can well by shaking vigorously for 2 to 4 minutes.

Use a paint can opener to open can. Open can slowly as to not spill any paint/stain and to not cause any splashing. (Stain is much more viscous than paint it.)

Place lid of can on surface with paint/stain side facing up. Never place the lid down where it will cause paint/stain to touch the surface.

When finished, place lid back on can and use a hammer to gently stamp down on the lid sides to close the can.

Gather all newspaper and throw in trash.

Rinse all brushes and place wet brushes in the brush can. If you are using foam brush, be sure they are in the sponge can.

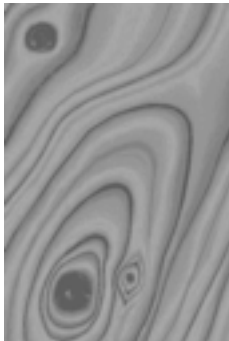
Staining

While wood in its natural state can provide breathtaking beauty, it doesn't always match the other colors or wood tones in our home. Adding stain to bare or stripped wood can both change the color and highlight the grain pattern of any interior wood.

We will use a water-based stain most of the time, which cleans up quickly and provides great color with little odor.

When staining a wood surface, always use a foam brush. This will soak up the stain better than a bristle brush and allow the stain to be absorbed better in the wood.

We will gently sand the wood to help the wood absorb the stain better. To open the pores in preparation for staining. Begin with a medium-grit sandpaper (#120). Work your way to a final sanding with a fine-grit sandpaper (#220). Always sand in the direction of the grain to avoid leaving unsightly scratches.



Stain along the grain of the wood. The grain is the lines you will see in the wood, which usually run in one direction. When staining, lightly brush the wood along the direction with the grain and be sure to soak up any dripping or soaked areas. Stain will dry quicker and look better when applied thinner.

Always use staining gloves when working with the stain so that you don't get any on your hands. You will also want to use a smock to protect your clothes.

Painting

Use a bristle brush to paint wood surfaces. These brushes have thin hairs that may come off during the painting process, so keep an eye out for loose strands in the paint.

Apply a thin coat of paint to the wood surface, painting in the same direction and covering the entire surface.

Don't apply two different colors of paint at the same time. Colors may bleed into each other. Always paint one color at a time, giving plenty of time for the paint to dry.

Refer to the paint can for drying times to add a second coat of paint or for dry to the touch.

